

CONSERVATION *Showcase*

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service
Helping People Help the Land

No-till, Cover Crop Conservation Combo

Lynn Betts, August 2011

Controlling soil erosion is one of the big reasons farmers have switched to no-till. But that's not why conservation-minded Arliss and Todd Nielsen made the switch six years ago on the 1200 acres of corn and soybeans they own and rent in Wright County.

The land they farm is fairly flat, so their savings came in areas other than soil. "High fuel costs prompted us for one thing," Todd says. "It was the savings in labor and machinery costs, too," says Arliss. "A new tractor can cost \$200,000 and more—we don't have to do that. We don't have to maintain the v-ripper or field cultivator and other machinery either. We have pretty flat, wet soils and we worked the ground before, some of it two or three times. But no more," he adds.

The father-son team had thought initially of no-tilling just soybean ground, Arliss says, but after he watched no-till work one year in Minnesota he was convinced. "I couldn't see any difference in yields on those no-till fields so we jumped in with both feet on every acre," he says. "Our yields don't jump up with no-till, but they're holding steady. Our yields have been very comparable in the county. The corn off our home farm last year was 165 bushel an acre because it was a wet year. But it was 200 bushels an acre the year before. What I really look at is keeping labor and fixed costs down," says Arliss. "Our 230 horsepower tractor, the biggest one we have, will do all the corn planting and hauling crops in. We did buy a new no-till planter when we switched—a White 12-row planter—and we have a Great Plains drill we use for 10-inch soybean rows. We hire out for spraying and fertilizer—except we do



Todd and Arliss Nielsen think their no-till and cover crop combo is building organic matter, and may eventually reduce the amount of nitrogen they need to apply.

sidedress ourselves and put starter fertilizer on with the planter."

Building soil now

"While we weren't losing topsoil, we wanted to build it," Todd says. "We're looking forward to building more organic matter. We soil test by grid sampling, and we've already seen increases in organic matter," he says.

"Our soil tilth was good with no-till, but it's that much better with cover crops," Arliss says. "We can see the difference in the soil."

"It's bringing earthworms back into our fields," Todd says. "The rye hasn't caused a bit of problem with combining. You might think the grass would add

CONSERVATION *Showcase*



The Nielsens say before they started using no-till and cover crops, they couldn't find an earthworm in their fields. They're coming back now.

problems to planting, but it's actually made it easier to plant with our no-till planter," he adds. "You can dig it up with a spade and the soil just crumbles in your hand, even when it's a little wet. Without these cover crops and no-till you'd just get a ball of mud."

Arliss, who has been farming "ever since dirt" (actually since 1953) and Todd, who's farmed with him for 31 years, admit the new practice is an experiment. "We're the first in this area to try cover crops," Arliss says. "No one around here can really tell you what to do for sure. We may be a little far north for some cover crops, we'll see."

This is the second year Arliss has tried cover crops on 350 acres. Todd will fly in cover crop seedings on land he farms before harvest this fall for the first time. "The first time we had cover crops flown on, in September of 2009, we didn't know anything about cover crops. We didn't have the right winter-hardy seed—the annual rye didn't live through the winter," Arliss says. "The deep rooted sweet clover and the nitrogen fixing hairy vetch look like a good part of cover crops, but they didn't survive the winter on our soybean stubble ground either. We're going to try seeding radishes and hairy vetch into standing corn this fall and see if the corn stubble will catch the snow and shelter those young crops through the winter."

Arliss tried both flying cereal rye seed onto standing corn in late August and drilling cereal rye into soybean

stubble as late as October. The late-drilled seeds didn't produce as healthy a stand as Arliss would like, but the cereal rye that was flown on produced a beautiful, thick stand last spring.

"Arliss thinks it takes a combination of practices to best protect his natural resources, and he's not afraid of trying something new," says Connie Roys, NRCS District Conservationist for Wright County. "He and Todd will experiment—read about something and then try it. Arliss is the first in the county to use cover crops on such a large scale."

Fixing, absorbing nitrogen

"We're hoping the cereal ryegrass will consume the fertilizer, and when we spray it in the spring and it decays, that nitrogen in the root and shoots of the ryegrass can be taken up by the corn," Arliss says. "The idea of using a deep rooted plant like sweet clover with it is to use those roots to absorb nitrogen. Along with that, the plants like hairy vetch can fix nitrogen in the soil."

"It's still too early to tell, but I think we'll see an increase in yield with cover crops over time," says Arliss. Todd hopes yields can stay high with less nitrogen because of the potential for cover crops to store nitrogen over time. "I expect to eventually use less nitrogen because I'm using these cover crops," Todd says. "We'll see how our yields hold up."

Fertilize in spring only

"We apply all our fertilizer within 30 days of corn or beans being planted," says Arliss. "No fall fertilizers. In the spring, we use a split application. Half goes on as anhydrous early. We also use a starter fertilizer at planting. Then we use the early-season nitrate test at the four leaf stage to tell us how much to side-dress with 32% liquid N. We also have a leaf sample test for micronutrients. We use a prescription card to get variable rate application across the field—the Co-Op does all that."

"We're not necessarily using less fertilizer, but we're putting more nitrogen where the crop can use it and less nitrogen on or in the ground where the crop can't use it," Todd says.

"There's a lot of hog and chicken manure available

CONSERVATION *Showcase*

around here, and we use some manure,” Arliss says. “But manure has a lot of phosphate in it, so we have to be careful we don’t get that built up in the soil.”

Payments for Cover Crops

Arliss and Todd work together, but not in a formal partnership or corporation. Arliss owns 480 acres, and he and Todd rent the rest. Todd owns a computer repair business where he works full time, with time off for planting and harvesting. The no-till and cover crop combo fits his limited time for farming.

Todd is receiving payments from the Mississippi River Basin Initiative for using cover crops, monitoring water quality and otherwise participating in the water quality improvement program. Arliss received payments from the Environmental Quality Incentives Program for his first year of cover crops, and is now receiving payments for enhanced cover crops for a limited time through the Conservation Stewardship Program (CSP). One of fewer than 20 Wright County producers selected for the program, Arliss chose to apply cover crops as one of the conservation enhancements.

Like other farmers accepted into the CSP, Arliss took an initial self-screening test, then worked with the local NRCS office to choose new conservation activities he would be willing to undertake for the program. He used the NRCS “Conservation Measurement Tool” with NRCS as part of his application. His overall conservation performance of natural resources care on

his land, and his willingness to undertake new activities, was ranked against other applicants in a detailed scoring system designed by NRCS.

“Connie Roys at the NRCS office in Clarion tells me I have more points than I need for this CSP program,” says Arliss. “We’ve got 80 acres devoted just to wildlife habitat, and that helps in the CSP program. On that 80, we have half a mile of filter strips with a wildlife mixture of prairie grasses planted along both sides of the White Fox River. We’ve also got CRP grass strips around our buildings here at home, with trees and shrubs interspersed with prairie grasses. It’s a strip of 100 feet of grass, 30 feet of trees, and 10 feet of shrubs. It’s a living snow fence, and makes a big difference on snow around our buildings in the winter.”

Arliss also planted more than 3200 trees—everything from green ash to hickory to pin oak and cherry—in 2004 for a riparian buffer on the 80-acre piece of land devoted to wildlife, again on both sides of the White Fox River. “That 80 acres is marginal farmland at best,” Arliss says. “It’s poor soil, some is rocky, and some is wet. This wildlife use is just a better use of the land all the way around.”

His family likes to hunt, Arliss says, and all that habitat helps the pheasant population. “One spring day a while back we counted 60 pheasants coming out of that 80,” he says. “But I haven’t been able to get them up close to the house yet with the new grass and tree plantings.” Todd reminds Arliss, though, that he’s got some of the prettiest flowers to look at that change through the season.

Arliss also restored a large wetland on his land, and is in line to get a bioreactor installed in a tile line. “I want to see what that will do to cut down on the amount of nitrogen leaving the farm in groundwater,” Arliss says. “I’ve got grass borders around my farm because I don’t want soil or nutrients leaving my farm.”

Arliss got the top rating for wildlife habitat—more than 10 percent of his land in habitat—that you can get for the CSP. And that makes him happy. “I think we can maintain our profit, with lower input costs using no-till and cover crops, on fewer acres so that we can still have room for wildlife on other parts of our land,” Arliss says.



Todd and Arliss Nielsen think their no-till and cover crop combo is building organic matter, and may eventually reduce the amount of nitrogen they need to apply.

CONSERVATION *Showcase*

Cover Crops: Multiple In-field Benefits



Jeremy Singer, ARS
Research Agronomist

In a survey of crop farmers in Iowa, Illinois, Indiana, and Minnesota five years ago, Jeremy Singer found only 18% of farmers reported ever using cover crops. “I’m confident that’s changing, though,” the ARS research agronomist says. “The cost-share USDA is offering in conservation programs and USDA promotion is making a difference. We’ve

been talking about cover crops for a long time, but now momentum is building,” says Singer, who’s been working with cover crop research in Iowa for 9 years.

Singer says cover crop plant choices for a corn-soybean rotation in Iowa are limited. “Your best choices are cereal (winter) rye, winter wheat, and triticale wheat,” he says. He makes a distinction between cereal rye and annual ryegrass—don’t use annual ryegrass, he warns, because it won’t make it through the winter.

Cover crops are one of only a few conservation practices that have so many multiple in-field benefits, says Singer.

He cites three dominant advantages of using cover crops:

1. soil protection from erosion
2. cycling of nutrients, and
3. adding organic matter to the soil.

Related benefits that can come from cover crops include alleviating compaction, increasing water holding capacity in the soil, and increasing beneficial insects. Singer says he hasn’t quantified it in research, but he’s also seen more earthworms in cover crop fields.

Big question: rate of N release

There’s much more to be learned about cycling of nutrients, Singer says, but the idea is that nutrients susceptible to runoff or leaching can be captured in the roots of the cover crop. As the cover crop plant dies, N is released.

“What we don’t know is how rapid that release is,” Singer says. “That, and whether and when it’s available to the crop, are the big questions.”

Singer says ARS and other research is showing that N rates don’t need to be increased with cover crops, but they can’t be decreased either.

He sees huge potential for cover crop use in 1) coupling cover crops with manure to trap the nutrients of manure in plant biomass and 2) using cover crops to offset the carbon removed if corn stover is harvested.

Jeremy Singer is a research agronomist with the Agricultural Research Service National Laboratory for Agriculture and the Environment in Ames. Contact him at 515-294-5502 or jeremy.singer@ars.usda.gov